

## **WHAT IS CLAIMED IS:**

1. An apparatus for controlling a bit rate during a reverse play of a digital video stream decoded by at least one group of pictures including subgroups of pictures having a plurality of pictures and a picture period, said apparatus comprising:

a sorting unit for receiving the group of pictures and sorting intra-coded pictures, predictive-coded pictures and bidirectionally predictive-coded pictures from the received group of pictures;

a determining unit for determining a bit rate using size information from an intra-coded picture of a first subgroup of pictures in the group of pictures received from the sorting unit, and setting bit rates of next subgroups of pictures using the determined bit rate;

an intra-frame encoding unit for converting the predictive-coded pictures into intra-coded pictures for a reverse play using the set bit rates;

a storing unit for storing the intra-coded, the converted intra-coded, and the bidirectionally predictive-coded pictures received from the sorting unit; and

a decoding unit for decoding and outputting the intra-coded, the converted intra-coded and the bidirectionally predictive-coded pictures received from the storing unit.

2. The apparatus of claim 1, wherein the determining unit sets the bit rates with respect to a state of the storing unit and the determined bit rate.
3. The apparatus of claim 2, wherein the state of the storing unit is a remaining capacity of the storing unit.
4. The apparatus of claim 1, wherein the determining unit is part of the intra-frame encoding unit.
5. The apparatus of claim 2, wherein the determining unit is part of the intra-frame encoding unit.
6. The apparatus of claim 1, wherein the storing unit includes:
  - a bidirectionally predictive-coded frame memory for storing the bidirectionally predictive-coded pictures received from the storing unit and;
  - an intra-coded frame memory for storing the intra-coded and the converted intra-coded pictures received from the storing unit.
7. The apparatus of claim 1, further comprising a buffer linker containing pointing information for outputting the pictures stored in the storing unit to the decoding unit in a reverse play order.

8. A method of controlling bit rates of a plurality of pictures in the group of pictures while a video stream including at least one group of pictures is reverse played in a digital video play apparatus, said method comprising:

    sorting intra-coded, predictive-coded and bidirectionally predictive-coded pictures from the received group of pictures;

    determining size information from the intra-coded picture of a first subgroup of pictures in the group of pictures;

    determining a bit rate from the size information, and setting bit rates required for encoding the predictive-coded pictures of next subgroups of pictures contained in the group of pictures into intra-coded pictures, using the determined bit rate; and

    encoding the predictive-coded pictures into intra-coded pictures using the set bit rates.

9. The method of claim 8, wherein the setting of the bit rates is performed with respect to the size information and a state of the storing unit.

10. The method of claim 8, wherein the bit rates of a next subgroup of pictures are determined using the determined bit rate of an intra-coded picture of the first subgroup of pictures in each corresponding group of pictures.

11. The method of claim 8, further comprising storing the encoded intra-coded pictures and decoding the encoded intra-coded pictures and outputting the decoded pictures in a reverse play order.

12. A method comprising:

receiving a stream of digital video data including at least one group containing at least two different types of pictures;

determining at least one bit rate using size information from a picture of a first type contained in a first subgroup within the at least one group of pictures received and setting the at least one bit rate for next subgroups of pictures; and

converting the second type of pictures into the first type of pictures for a reverse play operation using the set at least one bit rate.

13. An apparatus comprising:

a sorting unit for receiving a stream of digital video data including at least one group containing at least two different types of pictures and sorting the different types of pictures from the at least one group of pictures received;

a determining unit for determining at least one bit rate using size information from a picture of a first type contained in a first subgroup within the at least one group of pictures received and setting the at least one bit rate for next subgroups of pictures; and

an encoding unit for converting the second type of pictures into the first type of pictures for a reverse play operation using the

set at least one bit rate.

14. An encoder comprising:

a determining unit configured to receive a first picture type, said first picture type used to set a bit rate corresponding to the size information of a second picture type; and

an encoding unit for converting the first picture type into the second picture type using the set bit rate.

15. A method for encoding comprising:

receiving a first picture type used to set a bit rate corresponding to the size information of a second picture type; and  
converting the first picture type into the second picture type using the set bit rate.

16. An encoder for performing the method of claim 15, further comprising:

a determining unit configured to receive the first picture type to set the bit rate corresponding to the size information of the second picture type; and

an encoding unit configured to convert the first picture type into the second picture type using the set bit rate.

17. A video player apparatus comprising:

a video player that receives a stream of digital video data

including at least one group containing at least two different types of pictures from a digital video storage media, determines at least one bit rate using size information from a picture of a first type contained in a first subgroup within the at least one group of pictures received, sets the at least one bit rate for next subgroups of pictures, and converts the second type of pictures into the first type of pictures for a reverse play operation using the set at least one bit rate; and

a display unit that receives the first type of pictures and the converted pictures and provides a reverse image output according to a reverse display procedure.

18. A method comprising:

receiving a stream of digital video data including at least one group containing at least two different types of pictures;

determining at least one bit rate using size information from a picture of a first type contained in a first subgroup within the at least one group of pictures received;

setting the at least one bit rate for next subgroups of pictures;

converting the second type of pictures into the first type of pictures for a reverse play operation using the set at least one bit rate; and

displaying the received first type of pictures and the converted pictures for a reverse image output according to a reverse display procedure.

19. A video player apparatus for performing the method of claim 18, further comprising:

a video player that receives the stream of digital video data including the at least one group containing the at least two different types of pictures from the digital video storage media, determines the at least one bit rate using the size information from the picture of the first type contained in the first subgroup within the at least one group of pictures received, sets the at least one bit rate for the next subgroups of pictures, and converts the second type of pictures into the first type of pictures for the reverse play operation using the set at least one bit rate; and

a display unit that receives the first type of pictures and the converted pictures and provides the reverse image output according to the reverse display procedure.

20. An apparatus for controlling a bit rate during a reverse play of a digital video stream decoded by at least one group of pictures including subgroups of pictures having a plurality of pictures and a picture period, said apparatus performing the method of claim 8, further comprising:

a sorting unit for receiving the group of pictures and sorting the intra-coded pictures, the predictive-coded pictures and the bidirectionally predictive-coded pictures from the received group of pictures;

a determining unit for determining the bit rate that uses the size information from the intra-coded picture of the first subgroup of pictures in the group of pictures received from the sorting unit, and setting the bit rates of the next subgroups of pictures using the determined bit rate;

an intra-frame encoding unit for converting the predictive-coded pictures into intra-coded pictures for the reverse play using the set bit rates;

a storing unit for storing the intra-coded, the converted intra-coded, and the bidirectionally predictive-coded pictures received from the sorting unit; and

a decoding unit for decoding and outputting the intra-coded, the converted intra-coded and the bidirectionally predictive-coded pictures received from the storing unit.

21. An apparatus including the encoder of claim 14, the apparatus further comprising:

a sorting unit for receiving a stream of digital video data including at least one group containing at least two different types of pictures and sorting the different types of pictures from the at least one group of pictures received, and wherein the determining unit determines the bit rate using the size information from the picture of the first type contained in a first subgroup within the at least one group of pictures received and setting the bit rate for next subgroups of pictures.

22. A video player apparatus including the encoder of claim 21, the apparatus further comprising:

a video player that receives the stream of digital video data including the at least one group containing the at least two different types of pictures from a digital video storage media, determines the bit rate using the size information from the picture of the first type contained in the first subgroup within the at least one group of pictures received, sets the bit rate for the next subgroups of pictures, and converts the second type of pictures into the first type of pictures for the reverse play operation using the set bit rate; and

a display unit that receives the first type of pictures and the converted pictures and provides a reverse image output according to a reverse display procedure.